Commentary

Premature coronary heart disease risk factors & reducing the CHD burden in India

Recent estimates suggest that 80 per cent of CVD deaths occur in developing countries with substantial contribution from India[1]. This high burden is largely ascribed to the industrial and technological progress and the associated economic and social transformations. In India, the estimated adult prevalence (of the age >30 yr) of coronary heart disease (CHD) is around 8-10 per cent in urban settings and 3-4 per cent in rural areas, reflecting a rise of six-fold and two-fold respectively between 1960 and 2000[2]. It is estimated that by 2020, CVD will be the largest cause of disability and deaths in India. The burden of CVD risk factors is even more alarming. For example, there are currently 40.9 million people with diabetes and 118 million people with hypertension, which is anticipated to reach 69.9 and 213 millions respectively, by 2025 unless urgent population vide preventive steps are taken[3]. These startling numbers are compounded by the fact that Indians succumb to diabetes, high blood pressure and heart attacks 5-10 years earlier than their Western counterparts in their most productive years, leading to substantial economic losses both to individuals and the nation as a whole[4,5]. Hence, identifying the preventable/modifiable causes of CHD risk factors which are major contributor to CVD events is high priority. In this regard, the INTERHEART study[6], a large international case control study reported that tobacco use, obesity with high waist:hip ratio, high blood pressure, high LDL cholesterol/low HDL cholesterol, abnormal apolipoprotein A-1:B ratio, diabetes, low consumption of fruits and vegetables, sedentary lifestyles and psychosocial stress are 9 important risk factors/determinants of CVD which accounted for >90 per cent of population attributable risk of CHD globally. Two-thirds of this risk comes mainly from smoking and elevated Apo B and Apo A ratio.

While these factors are common to South Asians, certain differences were noted when compared to other population groups. These include younger age onset of CVD presentations, high levels of risk factors particularly tobacco chewing, smoking and high Apo B/Apo A 1 ratio. Though these risk factors form the nidus for atherosclerotic plaques, a not so well studied facet is the role of thrombosis and factors that increase thrombolytic plaques which are immediate causes of myocardial infarction (MI) and acute coronary syndrome (ACS).

The case-control study conducted by Panwar et al[7] assessing the relationship between atherothrombotic risk factors and premature CHD in young (<55 yr age) Indian population in this issue further explores this aspect to some extent. The authors conducted a hospital-based case-control study and collected data from 165 cases of acute coronary event and 199 controls matched in age, gender, and hospital in Bikaner, Rajasthan. One of the main findings is that both thrombotic (smoking, low fruit/vegetables intake, fibrinogen, homocysteine) and atherosclerotic (hypertension, high fat diet, dyslipidaemia) risk factors are significant in causing premature CHD in Indian population, which re-strengthen the current evidence on CHD risk factors and should help to form prevention strategies in India to reduce CVD burden. Current smokers had a significantly higher risk of premature CHD, which strengthens the need to reduce the high smoking rates in India through tough anti-smoking policies if a growing coronary artery disease epidemic is to be averted. A surprising finding was the relatively low prevalence of tobacco chewing in cases as compared to controls; however, this may be a chance finding due to the small study population or other issues such as a different socio-economic profile compared to the general population. The study suggests that smoking, low HDLC, hypertension, low intake of vegetables and fruits, are the most important modifiable risk factors for premature CVD. Further, the findings that low intake

of vegetables and fruits as an important risk factor of premature CHD could be contributing to the excess risk through the thrombotic pathway as rightly pointed out by the authors. A major limitation of this study is the lower proportion of women (7.9 % cases and 12.1 % controls), which limits generalizability.

Identifying the causes of premature CHD across many diverse regions in India with a standardised approach is a difficult research undertaking for many reasons. Although a large nation-wide prospective cohort study might be the ideal, one would need to enrol a very large sample in view of the relatively low incidence of CHD in the general population, and the challenges of the long follow-up required would be considerable. A more efficient approach is to use a matched case-control design, as in the current study, in which patients (cases) admitted to hospital with MI, and other such as unstable angina are interviewed and examined for possible risk factors, and results compared with a control population matched for age and sex from the hospital. Such a design can yield useful information but selection or recall biases might occur in the individuals who agree to take part as either cases or controls. Thus, the current study is broadly consonant with the INTERHEART study. The findings highlight the need for policy makers to develop strategies to cost-effectively screen the general population for high blood pressure, dyslipidaemia, diabetes and implement smoking cessation programmes, if necessary, offer affordable treatment to reduce the burden of CHD deaths. Additionally, policies to promote primordial prevention strategies in India such as regulation against tobacco use and promotion of protective lifestyle factors such as leisure time physical activity and regular intake of fruits and vegetables which are markedly lower among South Asians compared to western population.

Considering the size of this public health issue, the interventions can only be addressed through policy measures by means of legislation and regulatory approaches on agriculture and food (production, pricing, labelling), tobacco (production, sale, advertising) or physical activity (a conducive transport policy which favours urban cycle lanes, walking paths with curbs on private vehicular transport, facilities for leisure time exercise in community playgrounds and emphasising the importance of physical activity in school curriculum and at worksites) that have large impact on the mean level CHD risk factors at the population level. Given that just two simple risk factors (tobacco and Apo B/

Apo A-I ratio) explain more than two third of CVD risk, targeting tobacco, diet and physical activity may have enormous implications for the Indian population. Key elements of such strategies would include: (i) creation of an enabling environment for increasing awareness and adoption of healthy living habits by the community; (ii) early detection of individuals with risk factors and cost-effective interventions for reducing risk; and (iii) early detection of clinical cases and cost-effective secondary prevention measures to prevent long term complications.

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References

1. Gupta R, Joshi P, Mohan V, Reddy KS, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. *Heart* 2008; *94* : 16-26.

2. Ajay VS, Prabhakaran D. Coronary heart disease in Indians: Implications of the INTERHEART study. *Indian J Med Res* 2010; *132* : 561-6.

3. NCMH Background Papers. *Burden of disease in India*. New Delhi: National Commission on Macroeconomics and Health, Ministry of Health & Family Welfare, Government of India; 2005.

4. Sharma M, Ganguly NK. Premature coronary artery disease in Indians and its associated risk factors. *Vasc Health Risk Manag* 2005; *1* : 217-25.

5. Joshi PP, Islam S, Pais P, Reddy KS, Prabhakaran D, Kazmi K, *et al*. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *JAMA* 2007; *297* : 286-94.

6. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, *et al* on behalf of the INTERHEART Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet* 2004; *364* : 937-53.

7. Panwar RB, Gupta R, Gupta BK, Raja S, Vaishnav J, Khatri M, *et al*. Atherothrombotic risk factors & premature coronary heart disease in India: A case-control study. *Indian J Med Res* 2011; *134* : 26-32.